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EXAMINER

LEO, LEONARD R

ART UNIT	PAPER NUMBER
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3743

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

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GROUP 3700

Paper No. 27

Application Number: 09/099,632

Filing Date: June 18, 1998

Appellant(s): Insley, Thomas I. Et al.

Paul W. Busse

For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed June 5, 2002.

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(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

A statement identifying there are no related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief is correct.

(4) *Status of Amendments After Final*

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) *Summary of Invention*

The summary of invention contained in the brief is correct.

(6) *Issues*

The appellant's statement of the issues in the brief is correct.

(7) *Grouping of Claims*

Appellant's brief includes a statement that claims 1 and 21 stand or fall together and claims 31, 32 and 34 do not stand or fall together with respect to the rejections in view of Phillips and Bae, and claims 1-5, 9-10, 12-14 and 21-23 stand or fall together, claims 15, 18 and 32 stand or fall together, claims 16-17 and 19-20 stand or fall together, claims 31 and 34 do not stand or fall together with respect to the rejections in view of Rosman in view of Bae, and claims 14 and 24 do

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not stand or fall together with respect to the rejections in view of Rosman in view of Bae and Schubert and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) *Claims Appealed*

The copy of the appealed claims contained in the Appendix to the brief is correct.

Withdrawn claims 6-8, 11 and 25 are also contained in the Appendix.

(9) *Prior Art of Record*

The following is a listing of the prior art of record relied upon in the rejection of claims under appeal.

4,894,709	PHILLIPS ET AL.	1-1990
5,771,964	BAE	6-1998
4,347,896	ROSMAN ET AL.	9-1982
5,249,359	SCHUBERT ET AL.	10-1993

(10) *Grounds of Rejection*

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 21, 31-32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Phillips et al.

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Phillips et al discloses a heat exchanger (Prior Art Figures 1-3, column 2, lines 14-19) comprising a first layer 10 having a plurality of flow channels 14 with an aspect ratio of channel length to hydraulic radius of about 289.5:1 to 430.3:1 and hydraulic radius of about 46.5-48.4 μm (where channel length, $L=1.4\text{-}2.0\text{ cm}=14,000\text{-}20,000\text{ }\mu\text{m}$, hydraulic radius, $D_h/2=4 \times \text{area divided by perimeter divided by } 2 = (W_c \times b)/(W_c + b) = 46.5\text{-}48.4\text{ }\mu\text{m}$ or micrometers); a first cover layer 30; and manifolds 12 and 16 from manifold block 32; but does not disclose the first layer being a polymeric film material.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a polymeric material for the first layer, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. With respect to a film, it would have been obvious to one of ordinary skill in the art to employ a plate having any desired thickness to achieve a desired heat exchange or pressure strength.

Regarding claim 31, the recitation of "microreplicated" is considered to be a method limitation in an apparatus claim, which bears no patentable weight in this instance.

Regarding claim 32, the claimed limitations are met by *In re Leshin* above. The choice of a known material and its inherent physical properties, such as thermal conductivity, requires only routine skill in the art.

Regarding claim 34, the claimed limitations are met by *In re Leshin* above. The choice of a known material and its inherent physical properties, such as ductility or flexibility, requires only routine skill in the art.

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Claims 1, 21-23, 31-32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bae.

Bae discloses a heat exchanger (Figures 2-3, column 6, lines 13-14) comprising a first layer 31b having a plurality of flow channels 30 with an aspect ratio of channel length to hydraulic radius of about 5:1 to 600:1 and hydraulic radius of 127-2540 μm (column 6, lines 13-14, channel length, $L=1-6$ inch, and column 5, lines 22-24, hydraulic radius, $D/2$); a first cover layer 31a; and manifolds 26 and 28; but does not disclose the first layer being a polymeric film material.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a polymeric material for the first layer, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. With respect to a film, it would have been obvious to one of ordinary skill in the art to employ a plate having any desired thickness to achieve a desired heat exchange or pressure strength.

Regarding claim 31, the recitation of "microreplicated" is considered to be a method limitation in an apparatus claim, which bears no patentable weight in this instance.

Regarding claim 32, the claimed limitations are met by *In re Leshin* above. The choice of a known material and its inherent physical properties, such as thermal conductivity, requires only routine skill in the art.

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Regarding claim 34, the claimed limitations are met by *In re Leshin* above. The choice of a known material and its inherent physical properties, such as ductility or flexibility, requires only routine skill in the art.

Claims 1-5, 9-10, 12-23, 31-32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosman et al in view of Bae.

Rosman et al discloses a heat exchanger (Figure 2d) comprising a first layer 10 (e.g. a bottom layer) of polymeric material (column 8, lines 41-46) having a plurality of flow channels 20; a first cover layer 10 (e.g. a layer above the bottom layer); and manifold 16; but does not disclose a film material and a specific hydraulic radius and channel length to hydraulic radius aspect ratio.

Bae discloses a heat exchanger comprising a first layer 31b having a plurality of flow channels 30 and a cover layer 31a; wherein the channels have a hydraulic diameter of about 0.01 to 0.02 inch (where hydraulic radius is half of the hydraulic diameter, 0.05 to 0.1 inch or 127 to 254 μm) and an aspect ratio of about 5:1 to 600:1 for the purpose of achieving a desired heat exchange.

Since Rosman et al and Bae are both from the same field of endeavor and/or analogous art, the purpose disclosed by Bae would have been recognized in the pertinent art of Rosman et al.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ in Rosman et al a hydraulic radius of about 127 to 254 μm and an aspect ratio of about 5:1 to 600:1 for the purpose of achieving a desired heat exchange

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recognized by Bae. With respect to a film, it would have been obvious to one of ordinary skill in the art to employ a plate having any desired thickness to achieve a desired heat exchange or pressure strength.

Regarding claim 14, cross flow is a well known alternate of parallel flow.

Regarding claims 15-20, as applied above, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 31, the recitation of "microreplicated" is considered to be a method limitation in an apparatus claim, which bears no patentable weight in this instance.

Regarding claim 32, the claimed limitations are met by *In re Leshin* above. The choice of a known material and its inherent physical properties, such as thermal conductivity, requires only routine skill in the art.

Regarding claim 34, the claimed limitations are met by *In re Leshin* above. The choice of a known material and its inherent physical properties, such as ductility or flexibility, requires only routine skill in the art.

Claims 14 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rosman et al in view of Bae as applied to claims 1-5, 9-10, 12-23, 31-32 and 34 above, and further in view of Schubert et al.

The combined teachings of Rosman et al and Bae lacks perpendicular flow channels in adjacent layers.

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Schubert et al discloses a heat exchanger comprising a plurality of layers having a plurality of flow channels 14d; wherein the flow channels in adjacent layers are perpendicular for the purpose of achieving a desired heat exchange.

Since Rosman et al and Schubert et al are both from the same field of endeavor and/or analogous art, the purpose disclosed by Schubert et al would have been recognized in the pertinent art of Rosman et al.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to employ in Rosman et al perpendicular flow channels in adjacent layers for the purpose of achieving a desired heat exchange as recognized by Schubert et al.

Regarding claim 24, Figure 4 of Schubert et al discloses an upper cover layer forming the flow channels 14b with a lower first layer in indirect heat exchange relationship with the upper adjacent flow channels.

(11) *Response to Argument*

The Examiner agrees with appellants' assessment with respect to the disclosure of Phillips et al on page 7, paragraph 2 of the brief. However, appellants remarks are not commensurate in scope with the claims. Appellants recite "A heat exchanger for use with active fluid transport," where the recitation of "for use with active fluid transport" is considered to be a statement of intended use, even if claimed, does not merit patentable weight unless the body of the claim refers back to, is defined by, or otherwise draws life and breadth from such intended use. Furthermore, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the

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claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. *Ex parte Masham*, 2 USPQ2d 1647 (1987). As such, the claims recite a subcombination, namely a heat exchanger, not in combination with an active fluid transport. As evidence, the dependent claims further limit only the heat exchanger. It is noted that appellants filed copending application serial no. 09/099,269, now U.S. Patent No. 6,290,685 claiming "An active fluid transport device" with substantially the same limitations as the instant claimed invention.

Appellants' remarks with respect to the method of manufacture of the device are moot, since the instant claimed invention is a final product. The method of manufacture was nonelected without traverse in Paper no. 7.

Appellants' remarks with respect to *In re Leshin* are appreciated, but fail to recognize the expertise of one having ordinary skill in the art of heat exchange. The Examiner agrees that Phillips et al does not explicitly disclose employing a polymeric material, as indicated in the Office actions. Employing the materials as explicitly disclosed by Phillips et al does not involve obviousness, since the materials are fully disclosed within the reference and would equate to anticipation. *In re Leshin* is relied upon to teach obviousness of employing a known heat exchange material for its known physical properties. In the art of heat exchange, one of ordinary skill in the art clearly recognizes different materials exhibit different heat transfer, as well as different manufacturability, strength, weight, corrosion resistance, cost, etc. Known heat transfer materials range from metals to ceramics to polymers, and even paper. The employment of a polymeric material, which is a well known material employed in heat

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exchangers, would have been obvious to one of ordinary skill in the art of heat exchange. Appellants' do not suggest that polymeric materials in heat exchanger do not exist. Therefore, the patentability of the instant invention as claimed cannot hinge on the choice of material employed, especially when the claimed structural limitations are met by the prior art.

Appellants' remarks with claim 31 and the term "microreplicated" support the Examiner's position. The term refers to the manufacturability of a desired material. Arguendo, if the material is being claimed, the inherent physical properties affect the tolerance, not the manufacture of the material. Furthermore, the claimed limitation does not structurally define over the prior art of record. In the final product, the method of manufacture can be given weight, if the structure can only be defined by its manufacture limitations.

Regarding appellants' remarks with claim 32, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice, *In re Leshin*, 125 USPQ 416. In this respect, depending on the working environment of the device of Phillips, the cover plate may be formed of a different material such as metal, ceramic or graphite for improved strength, which has a higher thermal conductivity.

Regarding appellants' remarks with claim 34, with respect to *In re Leshin* above, the choice of a known material and its inherent physical properties, such as ductility or flexibility, requires only routine skill in the art. As appreciated by appellants' specification, various materials can be employed based upon the desired working environment. This is a

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fundamental tenet recognized by one of ordinary skill in the art. Should ductility and flexibility be a desirable property, the selection of any known material meeting this criteria would require only routine skill in the art.

Appellants' remarks with respect to Bae are believed repetitive of Phillips et al above. The Examiner's comments above are equally applicable and do need not be repeated.

Regarding appellants' remarks (page 19, paragraph 2 of the brief) with respect to the combination of Rosman et al and Bae, it is unclear why Rosman et al must disclose a method of manufacturing the device in order for one of ordinary skill in the art to fully grasp and appreciate the structure of Rosman et al. The manufacture of the device of Rosman et al has little to do with the prosecution of the instant invention as claimed. Rosman et al discloses a polymeric material as claimed. The instant invention as claimed is a final product, regardless of its manufacture. Appellants broadly claim a polymeric material, without any specific polymeric material recited. Again, appellants arguments are not commensurate in scope with the claims. The specific polymeric material is not claimed and any limitations with respect to manufacture are of no patentable moment. Again, one must ask who the person having ordinary skill in the art is and what is the level of his skill. In the art of heat exchange, the person having ordinary skill is typically an engineer versed in thermodynamics, fluid mechanics, material science, industrial processes, cost analysis, etc. The requirement of patent disclosures is such that one of ordinary skill in the art is enabled to make and/or use the device in industry.

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The manufacturability of Bae is of no consequence, since the secondary reference of Bae teaches the hydraulic radius and aspect ratio as claimed, which applicants do not dispute. Clearly, one of ordinary skill in the art would employ the teachings of Bae to achieve optimal heat exchange in the device of Rosman et al. This ordinary skill is further demonstrated in Rosman et al (column 8, lines 41-45), which applicants dismiss as “a general, cursory statement.” While the disclosure of Rosman et al in this respect does not disclose applicants’ specific quantitative claim limitations, it clearly sets forth the level of ordinary skill in the art. Applicants’ claimed quantitative limitations are not novel and unobvious as demonstrated by Phillips et al and Bae. The recitation of a “film” is merely a term intimating a relative dimension. However, if not claimed in some manner, the dimensional relations are believed to require only routine skill in the art. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The claims do not recite, “*a thin, generally flexible sheet* of polymeric material.” One of ordinary skill in the art clearly recognizes that employing a desired material thickness affects heat exchange, structural strength and rigidity. Appellants’ dictionary definition of “plate” is a textbook meaning, and not the art recognized meaning. The art term of a “plate” heat exchanger is not composed of a “rigid body of uniform thickness.” In fact, the thickness almost never uniform, where sub-surface groove channels are present, e.g. Rosman et al. Furthermore, typical plate heat exchangers have reinforcements to ensure the internal pressures do not cause buckling of the plates.

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Regarding appellants' remarks with respect to the combination (page 24 of the brief), the rejection is based on the primary reference of Rosman et al disclosing a polymeric plate heat exchanger having channels and manifold structure. The secondary reference of Bae teaches one of ordinary skill in the art to employ a desired dimensioned channel structure *for the purpose of achieving a desired heat exchange* (motivation emphasized). Without explicit instruction, one having ordinary skill in the art recognizes this fundamental teaching. As well known in the art of heat exchange, heat exchange is determined by several factors, including thermal coefficient of heat transfer surface material. The two main concerns with the person having ordinary skill in the art are pressure drop and heat transfer efficiency. The choice of material ranks very low on priority. Pressure drop relates to the amount of pumping required to facilitate the flow through the heat exchange flow channel. Heat transfer efficiency is related to the effectiveness of the thermal boundary layer removal. Drag, viscosity, turbulence all contribute to these two main design criteria. Material choice generally involves the environment and working fluids being employed, where corrosion resistance is a main concern.

Appellants' remarks with respect to claims 15, 18 and 32 are believed addressed by the Examiner on page 10 with respect to the rejection of claim 32 in view of Phillips et al. It is noted that claims 15 and 32 are directed to only a single first layer and a single cover layer. However, in claim 18, the two fluid heat exchanger of Rosman et al discloses (column 4, lines 62-65) plate requirements in adjacent layers may be redesigned to accommodate the relative working fluids. The person having ordinary skill in the art would recognize not only that the channels may be

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changed, but also the heat transfer coefficients by any one or more of the following may be employed: turbulence, material thermal conductivity, layer thickness, streamlining, etc.

Regarding appellants' remarks with respect to claims 16-17 and 19-20 are believed addressed by the Examiner immediately above and on page 10 with respect to the rejection of claim 32 in view of Phillips et al. It is noted that claims 16-17 are directed to only a single first layer and a single cover layer.

Appellants' remarks with respect to claim 31 are believed addressed by the Examiner on page 10 with respect to the rejection of claim 31 in view of Phillips et al.

Appellants' remarks with respect to claim 34 are believed addressed by the Examiner on pages 10-11 with respect to the rejection of claim 34 in view of Phillips et al.

Appellants' remarks with respect to the rejection in view of Rosman et al, Bae and Schubert et al are merely argumentative and do not specifically point out the supposed errors with respect to Schubert et al. However, Schubert et al (Figure 6a) discloses a cross current heat exchanger. Regarding claim 24, Schubert et al (Figure 4) discloses the cover layers are only in direct fluid contact with the layer it encloses and not in direct contact with the working fluid of the adjacent layer.

In summary, appellants attempt to downplay the expertise of the person having ordinary skill in the art. The skill level is not bound by the prior art of record. In the art of heat exchange, the person having ordinary skill is typically an engineer or technician versed in thermodynamics, fluid mechanics, material science, industrial processes, cost analysis, etc.

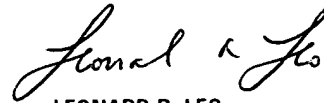
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Therefore, to employ a known heat transfer material based on its known desirable physical properties would have been obvious to one of ordinary skill in the art, *In re Leshin*, 125 USPQ 416. Appellants are claiming a "heat exchanger." The statement of intended use does not afford patentable weight in this instance, *Ex parte Masham*, 2 USPQ2d 1647 (1987). Claims drawn to an "active fluid transport device" were willingly filed in the aforementioned copending application, now U.S. patent. Patentability is based on the invention as claimed, not disclosed in the specification. Appellants' arguments with respect to the manufacturability of the instant invention and manufacturability of the prior art of record are moot, since the instant claimed invention is a final product capable of structural definition.

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For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

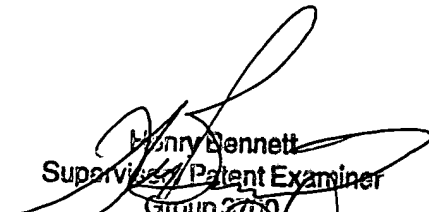


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Aug. 26, 2002
~~December 6, 2001~~

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